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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/532,922	03/22/2000	Bruce Emerson Wilcox	8993/108	8556

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EXAMINER	
LEI, TSULEUN R	
ART UNIT	PAPER NUMBER
2684	

DATE MAILED: 01/15/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/532,922	WILCOX ET AL.	
	Examiner	Art Unit	
	T. Richard Lei	2684	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-52 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-52 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed on October 16, 2002 have been fully considered but they are not persuasive. In this office action of final rejection, the examiner uses the references of Monma and Michaels, instead of Johnston, Monma and Michaels. Applicant argues that the Monma patent does not teach the instant invention, and the tuning circuit of Monma is in series with the transmission line. The examiner would like to point out that, in Fig.10, even though inductor 141 is connected in series, it is part of the antenna circuit, but not part of the tuning circuit for adjusting the impedance, and the adjusting/selection part are the parallel capacitors 142, 143 and 144 shown in Fig.10 & 11. Applicant also argues that if the tuning circuit of the Monma patent is disconnected from the transmission line, the signal circuit will also necessarily be disconnected from the antenna. This is not true if we look at Fig.11 of Monma patent and treat 141 and 143 as the transmission line circuit, and 144 as the parallel tuning circuit in the claim, than removing 144 will not disconnect the antenna signal circuit.

Applicant further argues that the tuning/matching circuit of Monma are not designed to affect the coupling between antenna elements. Referring to Fig.2 of Monma, it is clearly shown that by changing the values of the elements in the circuit of 221, 222, 204 and 205 the coupling between the whip antenna and the plane antenna is affected.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless-
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the

examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

3. Claims 1-31 and 39-52 are rejected under 35 U.S.C. 102(e) as being anticipated by Monma et al. (U.S. Patent 6,211,830).

Regarding Claim 1, Monma teaches a multiple antenna system, comprising: (a) first and second antennas (Fig.2);(b) first and second signal circuits connected with respective first and second antennas via first and second signal paths (Fig.2);(c) a first parallel tuning circuit connected in parallel with the first signal path, the first tuning circuit adjusting the impedance of the first antenna (Fig.10, Notice that even though inductor 141 is connected in series, it is part of the antenna circuit, but not part of the tuning circuit for adjusting the impedance.).

Regarding Claim 2, Monma teaches the multiple antenna system of claim 1 further comprising a third antenna connected

with a third signal source via a third signal path (Col.10, Lines 29-31 & Lines 36-38, more antennas may be provided).

Regarding Claim 3, Monma teaches the multiple antenna system of claim 1, wherein the first and second signal circuits are capable of generating electromagnetic signals (Fig.2).

Regarding Claim 4, Monma teaches the multiple antenna system of claim 3, wherein the electromagnetic signals include radio frequency signals (Fig.2).

Regarding Claim 5, Monma teaches the multiple antenna system of claim 1, wherein the first and second signal circuits generate signals at unique frequencies (Fig.2).

Regarding Claim 6, Monma teaches the multiple antenna system of claim 1, wherein the first and second signal circuits generate signals at the same frequencies (Fig.2).

Regarding Claim 7, Monma teaches the multiple antenna system of claim 1, wherein the first and second antennas are fabricated on a common dielectric material (Official notice: it

is common to have antennas fabricated on a common dielectric substrate).

Regarding Claim 8, Monma teaches the multiple antenna system of claim 1, further comprising an antenna housing capable of housing at least the first and second antennas (Fig.2).

Regarding Claim 9, Monma teaches the multiple antenna system of claim 1, wherein the second signal circuit is capable of generating signals in. multiple frequency bands (Figs.1-3, It is common to have a portable phone working in multiple frequency bands.).

Regarding Claim 10, Monma teaches the multiple antenna system of claim 9, wherein the first parallel tuning circuit increases the electromagnetic isolation between the first and second antennas in multiple frequency bands (Fig.2, Tuning of the impedance can increase the electromagnetic isolation between the two antennas.).

Regarding Claim 11, Monma teaches the multiple antenna system of claim 1, wherein the first parallel tuning circuit

includes an impedance matching circuit (Fig.2, 221, and 204; and Fig.10, variable capacitor 142).

Regarding Claim 12, Monma teaches the multiple antenna system of claim 11, wherein the impedance matching circuit matches an impedance of the second antenna via electromagnetic coupling with the first antenna (Fig.2; and Col.7 Line 66 to Col.8, Line 1).

Regarding Claim 13, Monma teaches the multiple antenna system of claim 11, wherein the impedance matching circuit matches an impedance of the second antenna (Fig.2; and Col.7 Line 66 to Col.8, Line 1).

Regarding Claim 14, Monma teaches the multiple antenna system of claim 11, wherein the first tuning circuit includes a plurality of impedance matching circuits, each impedance matching circuit being independently selectively connectable in parallel to the first signal path (Fig.10, electronic control; Fig.8, mechanical switching).

Regarding Claim 15, Monma teaches the multiple antenna system of claim 1 further comprising: (d) a second parallel

tuning circuit selectively connectable in parallel to the second signal path (Fig.2, 222).

Regarding Claim 16, Monma teaches the multiple antenna system of claim 15, wherein the second parallel tuning circuit increases the electromagnetic isolation (Col.7, Line 66 to Col.8, Line 1, Notice that electromagnetic coupling can be tuned for either tight coupling or for isolation.) between the first and second antenna.

Regarding Claim 17, Monma teaches the multiple antenna system of claim 1, wherein the first tuning circuit is selectively connectable to the first signal path near the first antenna (Fig.2, 221 and 204).

Regarding Claim 18, Monma teaches the multiple antenna system of claim 1, wherein the first tuning circuit creates an impedance at an input of the first antenna substantially equivalent to an open circuit at the transmission frequency of the second antenna (Fig.2, load impedance element 204 and 205 and be tuned to create an equivalent open circuit.).

Regarding Claim 19, Monma teaches the multiple antenna system of claim 1, wherein the first parallel tuning circuit includes a plurality of band tuning circuits, each band tuning circuit being independently selectively connectable with the first signal path (Figs.8-12).

Regarding Claim 20, Monma teaches the multiple antenna system of claim 19, wherein each band tuning circuit creates a different impedance at an input to the first antenna associated with the connection to the first signal circuit (Figs.8-12).

Regarding Claim 21, Monma teaches the multiple antenna system of claim 19, wherein the first tuning circuit includes a first band tuning circuit having an impedance matched to the second antenna and a second band tuning circuit having an impedance matched to a third antenna (Figs.8-12).

Regarding Claim 22, Monma teaches the multiple antenna system of claim 19, wherein the first parallel tuning circuit comprises an adjustable impedance based on selectively connecting different ones of the plurality of band tuning circuits with the first signal path (Figs.10-11).

Regarding Claim 23, Monma teaches the multiple antenna system of claim 19, further comprising a detector to control selective connection of individual ones of the plurality of band tuning circuits with the first signal path (Fig.3, No.242, detecting unit).

Regarding Claim 24, Monma teaches the multiple antenna system of claim 1, wherein the first signal source includes a radio transceiver (Fig.2).

Regarding Claim 25, Monma teaches the multiple antenna system of claim 1, wherein the multiple antenna system is adaptable for use in a cellular telephone (Fig.2).

Regarding Claim 26, Monma teaches a parallel tuning circuit for use in a multiple antenna system, comprising: (a) a first impedance matching circuit; and (b) a first switch selectively connecting in parallel the first impedance matching circuit with a transmission line connecting a first antenna to a first signal circuit (Figs.8-12).

Regarding Claim 27, Monma teaches the parallel tuning circuit of claim 26, further comprising (c) a second impedance

matching circuit; and (d) a second switch selectively connecting in parallel the second impedance matching circuit with a transmission line connecting a second antenna to a second signal circuit (Fig.2).

Regarding Claim 28, Monma teaches the parallel tuning circuit of claim 26, wherein the first impedance matching circuit matches an impedance of the second antenna (Col.2, Lines 48-52, changing the value of the load impedance element could mean the matching of impedance of the second antenna by the first matching circuit.).

Regarding Claim 29, Monma teaches the parallel tuning circuit of claim 26, wherein the first impedance matching circuit matches an impedance of the second antenna in multiple frequency bands (Col.2, Lines 48-52, changing the value of the load impedance element could mean the matching of impedance of the second antenna by the first matching circuit.).

Regarding Claim 30, Monma teaches the parallel tuning circuit of claim 26, wherein the first impedance matching circuit includes a selectable impedance (Figs.8-12).

Regarding Claim 31, Monma teaches the parallel tuning circuit of claim 30, wherein the selectable impedance is digitally selectable (Figs.8-12).

Regarding Claim 39, see Claims 1 and 16 for Monma's teaching.

Regarding Claim 40, see Claim 9 for Monma's teaching.

Regarding Claim 41, see Claim 10 for Monma's teaching.

Regarding Claim 42, see Claim 11 for Monma's teaching.

Regarding Claim 43, see Claim 12 for Monma's teaching.

Regarding Claim 44, see Claim 14 for Monma's teaching.

Regarding Claim 45, see Claim 15 for Monma's teaching.

Regarding Claim 46, see Claim 16 for Monma's teaching.

Regarding Claim 47, see Claim 18 for Monma's teaching.

Regarding Claim 48, see Claim 19 for Monma's teaching.

Regarding Claim 49, see Claim 20 for Monma's teaching.

Regarding Claim 50, see Claim 21 for Monma's teaching.

Regarding Claim 51, see Claim 22 for Monma's teaching.

Regarding Claim 52, see Claim 23 for Monma's teaching.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 32-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Monma in view of Michaels et al. (U.S. Patent 4,549,312).

Regarding Claim 32, Monma teaches the parallel tuning circuit of claim 30, wherein first impedance matching circuit dynamically adjusts impedance of the antenna. Monma failed to teach that the purpose of antenna impedance adjustment is to reduce the external interference. Michaels teaches that the antenna impedance adjustment is based on external interference (Michaels, Col.1, Lines 36-44). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teaching of Michaels to the teaching of Monma to extend the application of antenna tuning and matching to also include the interference cancellation by using the same techniques taught by Monma.

Regarding Claim 33, Monma as modified by Michaels teaches a method of adjusting impedance in a multiple antenna system, comprising: (a) detecting whether a first signal source connected with a first antenna via a first signal path is active or inactive (Michaels, Col.1, Lines 36-44, the center frequency of the receiver); (b) detecting whether a second signal source

(Michaels, Col.1, Lines 36-44, the presence of the undesired narrow band signals), connected with a second antenna via a second signal path is active or inactive, wherein the second antenna is proximate to the first antenna; and (c) selectively connecting a first parallel impedance circuit in parallel with the first signal path based on the active or inactive states of the first and second signal sources (Michaels, Col.1, Lines 36-44, varies the center frequency).

Regarding Claim 34, Monma as modified by Michaels teaches the method of claim 33, further comprising: (d) measuring external interference proximate to the first antenna (Michaels, Col.1, Lines 64-68); and (e) adjusting the impedance of the first parallel impedance circuit based on the external interference (Michaels, Col.1, Lines 64-68).

Regarding Claim 35, Monma as modified by Michaels teaches the method of claim 33, further comprising: (d) detecting whether a third signal source connected with a third antenna via a third signal path is active or inactive, wherein the third antenna is proximate to the first antenna; and (e) selectively connecting a first parallel impedance circuit in parallel with the first signal path if the first signal source is inactive and

the third signal source is active to reduce electromagnetic coupling between the third and first antennas. (Monma Figs.8-12).

Regarding Claim 36, Monma as modified by Michaels teaches the method of claim 33, wherein the first parallel impedance circuit comprises a plurality of selectively connectable parallel impedance circuits, and wherein (c) includes selectively attaching a selected one of the plurality of parallel impedance circuits in parallel with the first signal path (Michaels, Col.1, Lines 36-44).

Regarding Claim 37, Monma as modified by Michaels teaches the method of claim 33, further including (d) selectively attaching a second parallel impedance circuit with the second signal path if the first signal source is active and the second signal source is inactive to reduce electromagnetic coupling between the first and second antennas (Michaels, Col.1, Lines 36-44).

Regarding Claim 38, Monma as modified by Michaels teaches the method of claim 33, wherein the first parallel impedance circuit comprises a plurality of parallel impedance circuits,

and wherein (c) includes selecting a desired parallel impedance, selecting from a plurality of parallel impedance circuits one or more parallel impedance circuits that most closely matches the desired parallel impedance, and attaching the one or more selected parallel impedance circuits in parallel with the first signal path (Monma, Figs.8-12; Michaels, Col.1, Lines 36-44, varies the center frequency).

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Johnston et al. (U.S. Patent 5,784,032) teaches a compact diversity antenna.

Tonegawa et al. (U.S. Patent 5,748,054) teaches a high frequency hybrid switch.

Trikha et al. (U.S. Patent 6,072,993) teaches a portable radio operational in two frequency bands.

Nestlerode (U.S. Patent 4,701,732) teaches a fast tuning RF network.

Belcher et al. (U.S. Patent 5,589,844) teaches an automatic antenna tuner for mobile radio.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to T. Richard Lei whose telephone number is 703-305-4828. The examiner can normally be reached on 8:30 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dan Hunter can be

reached on 703-308-6732. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-5403 for regular communications and 703-308-5403 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

TRL

TRL
January 10, 2003

[redacted] 1/12/03